

Doo Doo Doo

Input file: **standard input**
Output file: **standard output**
Time limit: 2 seconds
Memory limit: 1024 megabytes

Little Ika: Doo Doo Doo ~.

Hyacinthia wants to go to the center of the "Cloud End Ruins" Eye of Dawn to search for loot, but there are n walls blocking her path. The i -th wall is a circle centered at the origin $(0, 0)$ with a radius of r_i . There are k_i doors on the wall, and the coordinates of the j -th door are given by $(r_i \cdot \cos(\frac{2\pi}{M} \cdot p_{i,j}), r_i \cdot \sin(\frac{2\pi}{M} \cdot p_{i,j}))$. The thickness of the wall and the width of the doors are negligible, and Hyacinthia cannot fly over the walls.

Hyacinthia wants to ask you m times. Each time she will tell you her starting point, and you need to answer what the shortest distance to the center is. The starting point is guaranteed to be on the inner side of a wall and right next to the wall surface.

Input

The first line contains two integers n, m ($2 \leq n \leq 2 \cdot 10^5, 1 \leq m \leq 2 \cdot 10^5$), representing the number of walls and the number of queries.

The next n lines describe each wall. Each line starts with two integers r_i, k_i ($1 \leq r_i \leq 10^8, 0 \leq k_i \leq 2 \cdot 10^5$), representing that the i -th wall is a circle with radius r_i and has k_i doors. Following this are k_i integers $p_{i,1}, p_{i,2}, \dots, p_{i,k_i}$, representing that the coordinates of the j -th door are $(r_i \cdot \cos(\frac{2\pi}{M} \cdot p_{i,j}), r_i \cdot \sin(\frac{2\pi}{M} \cdot p_{i,j}))$, where $M = 3.6 \cdot 10^8$. It is guaranteed that $0 \leq p_{i,1} < p_{i,2} < \dots < p_{i,k_i} < M, k_n = 0, \sum_{i=1}^n k_i \leq 2 \cdot 10^5$, and $1 \leq r_1 < r_2 < \dots < r_n \leq 10^8$.

The next m lines each contain two integers t_i, q_i , indicating that if Hyacinthia starts from the inside of the t_i -th wall at the point $(r_{t_i} \cdot \cos(\frac{2\pi}{M} \cdot q_i), r_{t_i} \cdot \sin(\frac{2\pi}{M} \cdot q_i))$, what is the shortest distance to the origin (if it is not reachable, please output "-1").

Output

For each query, output a single line with a floating-point number representing the answer. If it is not reachable, output "-1". An answer is considered correct if the relative or absolute error does not exceed 10^{-6} compared to the standard answer.

Example

standard input	standard output
3 4	2.0000000000
2 2 0 90000000	5.0000000000
5 0	7.4056093871
8 0	-1
1 114514	
2 0	
2 180000000	
3 233	